

CLAIMS

What is claimed is:

1. A marine vessel having a plurality of separate liquid cargo tanks located below the deck plate, the tanks having a generally highest point above the baseline of the ship, at least a portion of the deck plate being located above each tank and each tank having a highest point available above the baseline of the ship, the improvement which comprises a plurality of apertures in said deck plate communicating with the respective tank therebelow, said plurality of apertures being positioned substantially as close to the highest point of the tank above the baseline of the ship, and a separate expansion trunk positioned on said deck plate and over said apertures, said trunk being secured in fluid-tight relation with said deck plate and surrounding said plurality of apertures in said deck plate above each tank, to thereby form an expansion space to serve the cargo in the respective tank therebelow, said expansion trunk being in fluid communication with pipelines for the venting of the tank.

2. The vessel according to claim 1, where each said expansion trunk is located directly above the respective tank therebelow and as far forward as possible.

3. The vessel according to claim 1, wherein said plurality of apertures are slots configured to provide openings having a sufficient area such that there is approximately less than a 0.5 pound per square inch pressure difference between the opposing tank side and trunk side of said deck plates when the tank is being loaded at 200% of its maximum load rate.

4. The vessel according to claim 2, wherein said slots are between approximately 2 and 3 centimeters wide and one half of the length of a deck plate.

5. The vessel according to claim 1, where each said expansion trunk has an interior volume of at least 2% of the volume of the respective tank therebelow for liquid

cargo storage.

6. The vessel according to claim 1, wherein said apertures in the deck are positioned in one or more deck plates.

7. The vessel according to claim 1, wherein said apertures in said deck plate are located directly over each associated tank and as far aft on the tank as possible.

8. The vessel according to claim 1, wherein each said trunk has dimensions of between about 10 to 40 meters in length, about 5 to 15 meters wide and about 2 to 3 meters high.

9. A system for fluid storage for transport, which comprises a plurality of separate liquid cargo tanks located below a deck plate of a marine vessel, a portion of the deck plate located above each tank being provided with a plurality of apertures communicating with the tank therebelow, and a separate expansion trunk secured in fluid-tight relation with the deck plate and surrounding said plurality of apertures in the deck plate above each tank, to thereby form an expansion space to serve the fluid cargo in the tank therebelow, said expansion trunk including pipelines for venting the tank and enclosing a volume at least that required for compliance with maritime regulations for an expansion space for liquid cargo storage.

10. The system according to claim 9, wherein said expansion space of each said expansion trunk for fluid cargo storage is at least about 2% of the amount of under deck space for use as fluid cargo storage.

11. The system according to claim 9, wherein each said expansion trunk is located directly above the associated tank and as far forward as possible.

12. The system according to claim 9, wherein each said expansion trunk is located directly above the associated tank and as far aft as possible.

13. The system according to claim 9, where each said expansion trunk is located at the highest point in the associated tank above the baseline of the vessel.

14. The system according to claim 9, wherein each said expansion trunk includes a crude oil washing pipeline and is configured for being connected with one or more of a removable crude oil washing machine or a permanently installed crude oil pipeline washing machine.

15. The system according to claim 14, wherein each said expansion trunk includes at least one side wall and a top wall, said side wall and top wall each having inner sides, said inner sides being at least substantially free from one or more primary structural members of said trunk.

16. The system according to claim 9, wherein said apertures are elongated slots which are configured such that there is approximately less than a 0.5 pound per square inch pressure difference between the opposing tank side and trunk side of the deck plates when the tank is being loaded at 200% of its maximum load rate.

17. The system according to claim 16, wherein said slots which are approximately between 2 and 3 centimeters wide.

18. The system according to claim 16, wherein said slots are approximately one half of the length of a deck plate.

19. The system according to claim 9, wherein said trunk has dimensions of between about 10 to 40 meters in length, about 5 to 15 meters wide and about 2 to 3 meters high.

20. The system according to claim 9, wherein each said trunk includes an alternative vent line and the associated tank has a highest point in the tank above the baseline of the ship, said alternative vent line being in fluid communication with the highest point in

the tank above the baseline of the ship.

21. A marine vessel comprising a plurality of liquid cargo tanks located below deck plates of a deck, and each tank having a portion of deck plate as a highest point above the baseline of the ship, which comprises:

a plurality of trunks positioned on the respective deck plates, the portion of the tank located at the highest point above the baseline of the ship being in fluid communication with each said trunk, and said each said trunk being secured in fluid-tight relation with the deck plate above each said associated tank, to thereby form an expansion space to serve the liquid cargo in the tank therebelow, each said expansion trunk being in fluid communication with pipelines for the venting of the tank.

22. The marine vessel according to claim 21 wherein each said trunk is located above a portion of the tank located at the highest point above the baseline of the vessel, the portion of the tank above the highest point including one or more deck plates, the one or more deck plates having a plurality elongated slots located within the periphery of said fluid-tight structure of said trunk and deck plates, and in fluid communication with said tank.

23. The marine vessel according to claim 21 wherein each said trunk is located above a portion of the tank, the portion of the tank above the highest point thereof including an alternative vent line being in fluid communication with said trunk and said trunk being in fluid communication with the tank through a plurality of elongated slots in the associated deck plates beneath said trunk.

24. A marine vessel having a plurality of separate liquid cargo tanks located below the deck plate, the tanks having a generally highest point above the baseline of the ship, at least a portion of the deck plate being located above each tank and as close as possible to the highest point above the baseline of the ship, the improvement which comprises a plurality of

apertures communicating with the tank below, and a separate expansion trunk secured in fluid-tight relation with said deckplate and surrounding said plurality of openings in the deck plate above each tank, to thereby form an expansion space to serve the cargo in the tank below.

25. The vessel according to claim 24, where each said expansion trunk is positioned above the forward portion of the tank.